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ABSTRACT

This study investigates the influence on sentence encoding of activating appropriate contextual knowledge. A group of 72 undergraduate students randomly assigned to four treatment groups read and were later asked to recognize sentences from a passage. In one group, subjects were told nothing about the passage from which the sentence was taken. In the other groups, the subjects were (1) told the title before reading the sentence, (2) told the title after the reading and before the testing, or (3) told the title before and asked to relate the sentence to it. After the initial passage reading, subjects were given a brief mathematical distractor test and then asked to identify sentences as old or new. Results show that title availability during encoding significantly increased both recognition of target sentences and rejection of distractor sentences. Providing the title immediately prior to testing but after reading did not improve performance over the no-title condition. It appears that awareness of context during encoding enables subjects to engage in unique encoding processes benefitting recognition as well as recall memory. (MSE)

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Context-specific Encoding Facilitates Sentence Recognition

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Abstract

The influence of activating appropriate contextual knowledge on the encoding of sentences was examined. Subjects read and were later asked to recognize sentences from Bransford & Johnson's "washing clothes" passage. Subjects were informed of the passage title prior to encoding, prior to testing, or not at all. Title availability during encoding significantly increased both recognition of target sentences and rejection of distractor sentences. Providing the title immediately prior to testing did not improve performance over the "no title" condition. Thus it appears that awareness of context during encoding enables subjects to engage in unique encoding processes which benefit recognition as well as recall memory.

Research in human memory over the past 15 years has repeatedly demonstrated that the presence of appropriate contextual information during encoding facilitates sentence memory (Dooling & Lachman, 1971; Bransford & Johnson, 1972; Schustack & Anderson, 1979). The specific role that contextual information plays in aiding memory is not universally agreed upon however. One widely held view is that the activation of prior contextual knowledge enables subjects to perform encoding operations which would not otherwise be carried out (Bransford & Johnson, 1972). These operations are assumed to lead to a unique and elaborated encoding of the test material which allows it to be more easily retrieved. Alba, Alexander, Hasher, & Caniglia (1981) offer an alternative to this "encoding" explanation. These authors point out that contextual information may aid sentence recall simply by providing a retrieval cue. During retrieval contextual information may serve to link one sentence to the next, thereby facilitating recall without playing a major role in determining what has been encoded from each individual sentence.

Alba et al. (1981) offer several recognition memory experiments to support their position. Using Bransford and Johnson's (1972) "washing clothes" and "making and flying a kite" passages as stimulus materials, these researchers examined recall and recognition memory for passage sentences. These passages are entirely referential in nature with no explicit mention made of the particular objects involved in each activity. They are

therefore rather vague and uninformative in the absence of their titles. Alba et al. (1981) replicated the finding that subjects who were told the passage title prior to study [Title Before subjects] recalled significantly more accurately than subjects who were not given the title [No Title subjects]. However, recognition memory performance by the two groups did not differ significantly. This lack of significant group differences in recognition memory is consistent with the hypothesis that TB and NT subjects encode equivalent information. The results therefore seem to support the Alba et al. (1981) contention that contextual information has little effect on what is encoded.

Alba et al. (1981) go on to suggest that all previous reports of contextual information aiding sentence memory are simply due to the use of recall as the dependent measure. However, the results of other experiments (Thorndyke, 1977; Smith, Adams, & Schorr, 1978; Schustack & Anderson, 1979), using slightly different methods and materials from those of Alba et al. (1981), indicate that contextual information aids sentence recognition. A possible basis for resolving this discrepancy can be found in the recent work of Einstein and Hunt (1980; Hunt & Einstein, 1981).

Einstein and Hunt (1980) suggested a distinction between relational processing and item-specific processing. Relational processing refers to subject activity at time of encoding which emphasizes similarities or relations among input events while item-specific processing emphasizes characteristics of the individual items. In studies of list learning these investigators have shown that relational and item-specific

processing influence both recall and recognition memory but do so in ways that are largely independent. For example, relational processing produces much greater clustering in recall than does item-specific processing. However, item-specific processing leads to more hits and fewer false alarms in recognition memory. The authors suggest these findings indicate that relational processing facilitates the formation of effective retrieval schemes whereas item-specific processing facilitates discrimination among items.

The Alba et al. (1981) and Bransford and Johnson (1972) experiments can be described in terms of these two types of processing as follows. For TB subjects, awareness of the passage topic presumably allows for both relational processing (focusing on how the sentences relate to each other and to the topic) and item-specific processing (focusing on individual sentence characteristics). In the absence of a title NT subjects presumably perform far less relational processing and mainly engage in item-specific processing. If this analysis is correct, Alba et al.'s (1981) results seem to suggest that relational processing does not facilitate recognition memory. This conclusion, however, is not consistent with Einstein and Hunt's (1980) findings in which both relational and item-specific processing influenced item recognition. A more viable interpretation of Alba et al. (1981) might be that the extra relational processing engaged in by TB subjects was at the expense of item-specific processing. The benefits of relational processing would thus be negated and similar performance by TB

and NT subjects would not be surprising. The present research involved a partial replication of the Alba et al. (1981) study in order to evaluate this interpretation of their findings.

Two experimental conditions were included along with the standard TB and NT conditions in the present experiment. A second TB condition was added in which the subjects were instructed to try to relate each sentence to the title. Thus the experiment included a TB group receiving relational instructions (TB+) and a TB group receiving no such instructions (TB-). The two TB groups were necessary to determine whether supplying the title was sufficient to achieve improved recognition performance through increased relational processing or whether additional instructions were required. A Title After (TA) condition was also included. Subjects in this condition received knowledge of the title after studying the passage. This condition was included to determine the extent to which knowledge of the title aids performance when relational processing involving passage and title could not be carried out during encoding.

All subjects in the experiment were asked to remember the same material. If, as Alba et al. (1981) claim, the availability of appropriate context has little or no effect on encoding processes, then no reliable differences would be expected among the experimental groups. This result would provide stronger evidence in support of Alba et al.'s (1981) claims than is presently available.

Method

Subjects.

Seventy-two undergraduates were randomly assigned to the four experimental conditions. Twenty-one subjects were tested in the TA condition while seventeen subjects were tested in each of the other conditions. The groups were of unequal size due to variablility in subject attendance at experimental sessions.

Materials.

The twelve sentences from the shorter version of Bransford and Johnson's (1972) "washing clothes" passage were used as stimulus materials. The passage was typed on an index card for presentation. The title of the passage did not appear on the card.

The recognition test materials consisted of a deck of 48 cards, each containing a single sentence, and an answer sheet numbered 1 to 48 with the words "old" and "new" following each number. The test was composed of the 12 target sentences and 36 distractor sentences. Two distractor sentences were produced from each target sentence by removing or replacing one or more words. The remaining 12 distractors were created by combining phrases from two target sentences to form each new sentence. The target and distractor sentences were randomly ordered with the constraint that no two sentences related to the same target sentence appear consecutively.

Procedure.

Subjects were tested in small groups. All subjects in a group were assigned to the same experimental conditon. All

subjects were told that the experiment had to do with memory and problem-solving ability. They were told they would read a short passage, which they were to remember, and that they would then be given a problem solving test followed by a memory test. Subjects were then given specific instructions prior to reading the passage. All subjects were informed that they would have three minutes to study the passage and that the memory test to follow would require recognition of passage sentences. These were the only instructions provided to TA and NT subjects at this point. TB+ and TB- subjects received additional instructions. These two groups were informed of the passage topic. In addition, TB+ subjects were instructed to "relate each sentence to the activity of washing clothes". TB- subjects did not receive these "relational" instructions.

Following presentation of the passage, subjects performed a 10 minute distractor task consisting of numerical problems. After the distractor task, the recognition memory test was administered. Subjects were told that the deck of cards they were given contained sentences from the passage as well as new sentences. They were instructed to go through the deck and identify each sentence as old or new. TA subjects were given the title of the passage at this point and informed that it should aid them on the memory test.

Results

Both mean and percentage correct recognition scores for subjects in each experimental condition are given in the Table 1. Performance on target (hits) and distractor (correct rejections)

items are given seperately and summed for an overall score.

The two TB groups had the highest percentage of both hits and correct rejections. A one-way ANOVA confirmed that presentation condition had a significant effect on overall correct performance (hits + correct rejections), $F(3,68) = 10.139$, $p < .001$. A Tukey's HSD test showed that the two TB groups performed significantly better than any of the other groups ($p < .01$). Performance by the TB+ and TB- groups and by the TA and NT groups did not differ significantly.

While the performance of the TB groups was superior to that of the other groups on both target and distractor items, their relative advantage was greater in rejection of distractors than in recognition of targets. In fact, an ANOVA using number of hits alone as the dependent variable did not show a significant effect of presentation condition. An ANOVA using correct rejections as the dependent variable showed the same pattern of results as the ANOVA using hits + correct rejections (i.e., TB subjects had a significant advantage). This result, that context's (i.e., relational processing's) major facilitory influence is in increasing correct rejections, has also been reported by Birnbaum, Johnson, Hartley and Taylor (1980). However, relational processing may aid in the recognition of targets as well. Examination of the Table 1 shows that the two TB groups had the highest percentage of hits. Although an ANOVA using hits alone does not show the experimental groups to significantly differ, this lack of significant differences may have been due to a lack of power rather than to lack of an actual

difference. The use of a small number of target sentences and a larger number of distractors may explain why the TB groups' superior performance is significantly superior on correct rejections but not on hits. Using the grouping produced by the Tukey's HSD analysis of the hits + correct rejections data, a t-test examining number of hits by TB subjects versus all other subjects was performed. TB subjects recognized significantly more targets, $t(70) = 2.07$, $p < .05$. Thus it appears that the presence of appropriate context during encoding, which affords the opportunity to engage in relational processing, aids performance on both targets and distractors.

Discussion

The main finding of the present research is that subjects who encoded the sentences with reference to the passage topic (i.e., relationally) outperformed all other subjects on sentence recognition. This finding may not seem surprising to many since it is essentially the one expected given Bransford and Johnson's (1972) explanation of the results of experiments using the same materials and examining recall memory (i.e., an encoding explanation). However, in view of recent work emphasizing the importance of context during retrieval, and minimizing its importance during encoding, (Anderson and Pichert, 1978; Hasher & Griffin, 1978; Alba et al., 1981) the present results are important.

Anderson and Pichert (1978) demonstrated that subjects encode information unrelated to the presentation context and that supplying an alternative context at test can make this information available. It should be pointed out that these

authors did not suggest that context has no effect on the encoding process. Alba et al. (1981) however have taken this position. They suggest that previous demonstrations of context aiding memory are due to the use of recall as the dependent measure. They point out that the large amount of retrieval required in recall makes it less sensitive than recognition as a measure of what is encoded. They then report null results from several recognition experiments similar to the one reported here and take these results as evidence that context has no effect on what is encoded. The problem with this reasoning is that null results should not be taken as proof of the null hypothesis. After making certain relatively minor changes in Alba et al.'s (1981) methods, the present experiment showed entirely different results. These results suggest that availability of the passage topic during study enables subjects to encode information which other subjects do not and that this unique encoding aids recognition memory.

The question remains as to why the results reported here were not obtained in the Alba et al. (1981) experiments. An important difference between their experiments and the present one may be subject knowledge about the memory test to be given. All subjects in the present experiment were aware they would be tested for verbatim sentence recognition. Presumably, this encouraged subjects (including TB subjects) to engage in a considerable amount of item-specific processing, focusing on individual sentence characteristics. Alba et al. (1981) did not inform subjects about the type of memory test to be used. This

may have negatively affected performance by TB subjects to a greater degree than other subjects since TB subjects who assumed they would be asked to recall the passage may have focussed on processing the passage as a semantic whole (i.e., relational processing) and neglected to focus on the specifics of each individual sentence (i.e., item-specific processing). NT subjects, on the other hand, presumably would engage in little relational processing and concentrate on item-specific processing regardless of their assumptions about the type of memory test to be given. As a result, TB and NT subjects might be expected to demonstrate roughly equivalent recognition performance even though differences between these conditions did exist during encoding.

In the present experiment, informing subjects that verbatim sentence recognition would be required may have encouraged both relational and item-specific processing by TB subjects which resulted in superior recognition performance. Furthermore it appears that explicit instructions encouraging relational processing of the passage had little effect on performance of subjects supplied with the title. The similar performance of the TB+ and TB- groups suggests that they processed the passage in a comparable manner. TB- subjects apparently engaged in relational processing without being explicitly instructed to do so while TB+ subjects did not neglect item-specific processing as a result of relational processing instructions.

Alba et al. might explain the present results by pointing out that knowledge of the story topic simply aids in the rejection of distractors which violate subjects' general

knowledge of the topic and recognition of targets which do not violate this knowledge. This would explain the superior performance of the TB groups versus the NT group without positing differences in what information was encoded. The performance of the TA group, however, is not easily handled by this formulation. These subjects had general knowledge of the topic available during testing but performed significantly poorer than the TB groups. This result makes an encoding explanation seem more appropriate. Only TB subjects had the opportunity to encode the test material with respect to the topic (i.e., engage in relational processing) and this unique encoding apparently facilitated their performance.

In summary, the present results demonstrate - contrary to claims by Alba et al. (1981) - that relational encoding processes involving contextual knowledge facilitate recognition memory for prose. While an explanation of contextual influence on memory would be simplest if a unitary encoding (a la Bransford & Johnson (1972)) or retrieval (a la Alba et al. (1981)) description were tenable, it is not. Rather, the present results and those of others suggest that contextual information has important influences on memory performance during both encoding and retrieval.

References

Alba, J.W., Alexander, S.G., Hasher, L., & Caniglia, K. (1981). The role of context in the encoding of information. Journal of Experimental Psychology: Human Learning and Memory, 7, 283-292.

Anderson, R.C., & Pichert, R.D. (1978). Recall of previously unrecallable information following a shift in perspective. Journal of Verbal Learning and Verbal Behavior, 17, 1-12.

Birnbaum, I.M., Johnson, M.K., Hartley, J.T., & Taylor, T.H. (1980). Alcohol and elaborative schemas for sentences. Journal of Experimental Psychology: Human Learning and Memory, 6, 293-300.

Bransford, J.D., & Johnson, M.K. (1972). Contextual prerequisites for understanding: Some investigations of comprehension and recall. Journal of Verbal Learning and Verbal Behavior, 11, 717-726.

Dooling, D.J., & Lachman, R. (1971). Effects of comprehension on the retention of prose. Journal of Experimental Psychology, 88, 216-222.

Einstein, G.O., & Hunt, R.R. (1980). Levels of processing and organization: Additive effects of individual-item and relational processing. Journal of Experimental Psychology: Human Learning and Memory, 6, 588-598.

Hasher, L., & Griffin, M. (1978). Reconstructive and reproductive processes in memory. Journal of Experimental Psychology: Human Learning and Memory, 4, 318-330.

Hunt, R.R., & Einstein, G.O. (1981). Relational and item-specific information in memory. Journal of Verbal Learning and Verbal Behavior, 20, 497-514.

Schustack, M.W., & Anderson, J.W. (1979). Effects of analogy to prior knowledge on memory for new information. Journal of Verbal Learning and Verbal Behavior, 18, 565-583.

Smith, E.E., Adams, N., & Schorr, D. (1978). Fact retrieval and the paradox of interference. Cognitive Psychology, 10, 438-464.

Thorndyke, P.W. (1977). Cognitive structures in comprehension and memory of narrative discourse. Cognitive Psychology, 9, 77-110.

Table 1

Mean and Percent Correct Recognition
for Target and Distractor Items

Item Type	Presentation Condition			
	TB+	TB-	TA	NT
Targets (hits)	9.24 (77%)	9.35 (77.9%)	8.76 (73%)	8.12 (67.7%)
Distractors (correct rejections)	31.35 (87.1%)	30.0 (83.3%)	25.62 (71.2%)	25.59 (71.1%)
Total (hits + correct rejections)	40.59 (84.6%)	39.35 (82%)	34.38 (71.6%)	33.71 (70.2%)

Note. Maximum number of hits possible = 12.
Maximum number of correct rejections possible = 36.